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14. ABSTRACT
In both public and private healthcare sectors, Poland is struggling to attain the high levels of care that the western world has already achieved. The rapid infusion of medical technology within the healthcare sector is critical to improving the quality of life of the general population. This need is even more acute in military medicine, as the Polish Armed Forces face new challenges that were incomprehensible a few decades ago. The United States/Poland Cooperative Telemedicine Program was supported by the U.S. Army Telemedicine Advanced Technology Research Center (TATRC). The team of Native American Industrial Distributors, Inc., (NAID), Visual Telecommunications Network, Inc. (Vitel Net) and the Military Institute of Health Service (MIHS) worked together with the goal of improving health care for Polish military personnel. In May 2006, a telecommunication system connecting military hospitals in Warsaw and Wroclaw, Poland was completed. Physicians at the MIHS will now be able to remotely treat patients and manage the health care of patients at the 4thMilitary Hospital in Wroclaw.

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1 Background

Information technology and telemedicine are complementary elements in healthcare service environments. New technology can never entirely replace direct contact between people, although it may, in many instances, represent an alternative and a supplement that contributes to a more efficient use of resources in healthcare. Telemedicine has no natural geographical boundaries. Currently, Internet technology enables the establishment of international working groups specializing in difficult diagnoses for patient groups with rare and serious medical conditions. Many countries, the United States being the prime example, take a global view and aim to make telemedicine health services and diagnostic centers available throughout the world to anyone who can afford to pay. The World Health Organization is also starting to adopt telemedicine solutions.
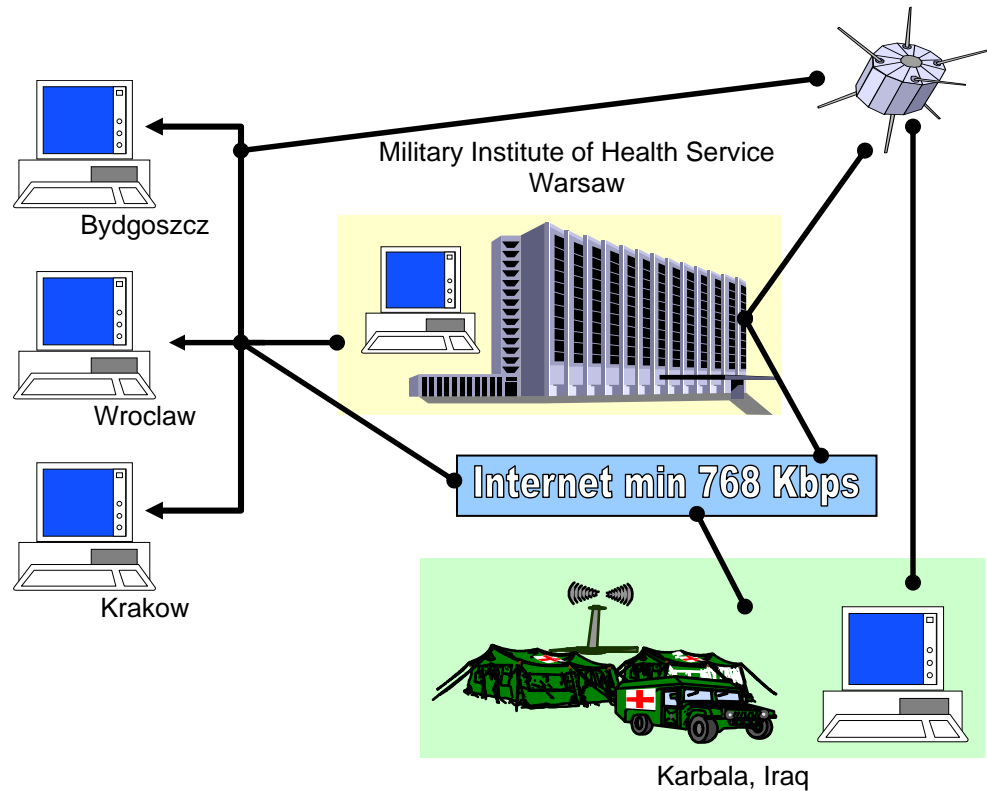
In both the public and private healthcare, Poland is struggling to attain the high levels of care that the western world has already achieved. The need for rapid infusion of technological and medical procedures changes within the healthcare sector is critical to the improvement of the quality of life of the people in Poland. This need is even more acute in military medicine, as the Polish Armed Forces face new challenges that were incomprehensible a few decades ago. Moreover, military hospitals in Poland provide regular services for the civilian population and play an important role at education and consultation centers. However, many cases are difficult to treat and may overwhelm the knowledge of local doctors.

Technology that allows delivery of teleconsultation and expert support can save many lives and improve health status of many soldiers and civilian personnel. Consulting with the best specialists from specialized hospitals would enable prompt diagnosis and treatment of patients according to highest medical standards.

At the Military Institute of Health Services (MIHS) in Warsaw, a comprehensive project called the Military Telemedicine Program (incorporating the military hospitals in Warsaw, Bydgoszcz, Wroclaw, Krakow) has been initiated. The suggested final version of the Military Telemedicine Program is presented in Figure 1. It will be developed in five stages:

1. point-to-point video teleconferencing/teleconsultation
2. development of secure data transmission infrastructure
3. the extension of further point-to-point telemedicine links
4. multiple point video teleconferencing/teleconsultation
5. maintenance of systematic, multiple point teleconsultation links

Figure 1: Schematic representation of telemedicine system for the Polish Armed Forces

The goal of the United States/Poland Cooperative Telemedicine Program was to accelerate the development of this system for the Polish Armed Forces. Recent advances in information technology were applied for the creation of a seamless, wireless telemedicine system between the MIHS located in Warsaw and the 4th Military Hospital located in Wroclaw, Poland.

The creation of this program has promoted national security and engendered more defense cooperation between the United States and Poland. The continued growth of this program represents a very important step towards strengthening U.S. presence in Eastern Europe.

1.1   Participants:

The United States/Poland Cooperative Telemedicine Program was a collaborative effort involving the following partners:

- Telemedicine Advanced Technology Research Center (TATRC)
- NAID
- Vitel Net, Inc
- Military Institute of Health Services, Warsaw, Poland

Technical and managerial oversight of this program was provided by TATRC. TATRC is a subordinate element of the United States Army Medical Research and Materiel Command (USAMRMC), and charged with managing core Research Development Test and Evaluation (RDT&E) and congressionally mandated projects in telemedicine and advanced medical technologies. To support its research and development efforts, TATRC maintains a productive mix of partnerships with federal, academic, and commercial organizations. TATRC also provides short duration, technical support (as directed) to federal and defense agencies; develops, evaluates, and demonstrates new technologies and concepts; and conducts market surveillance with a focus on leveraging emerging technologies in healthcare and healthcare support. Ultimately, TATRC's activities strive to make medical care and services more accessible to soldiers, sailors, marines, and airmen; reduce costs, and enhance the overall quality of military healthcare.

NAID. provided the principal investigator and served as the prime vendor for the U.S./Poland Collaborative Telemedicine Program. NAID specializes in telecommunications and Information Technology. NAID is an American Indian-owned, Service Disabled Veteran-owned, 8(a) certified company.

Vitel Net, Inc. supplied the equipment to establish the link between Warsaw and Wroclaw. Vitel Net, Inc. is a telehealth solutions provider that offers state-of-the-art multimedia information management solutions through a powerful toolbox. ViTel Net's unique, patented, revolutionary telemedicine technology allows for the practical application of telemedicine, both domestically and internationally, (i.e., to support National Emergencies, Homeland Defense Requirements, and US Military operations world-wide) in a cost effective environment. ViTel Net's MedVizer™ Enterprise Solution provides a unique blend of enabling technologies that can be tailored to satisfy a single health care department requirement or an integrated information manager and distribution facility for an entire health care enterprise. ViTel Net leverages existing health care infrastructures and data management resources, while filling in the gaps to enable the efficient, effective, practice of medicine without regard to time or space.

ViTel Net's MedVizer open architecture and rapidly adaptable software has been configured to establish seamless connectivity to existing civilian and military healthcare information systems. Within the military structure, connectivity has been established with the Composite Health Care System II (CHCSII), Field Deployable Medical Record (FDMR), the U.S. Army's Personal Information Carrier (PIC), and the Department of Defenses' Identification Card. MedVizer software has also been used to provide WRAMC's Integrated Clinical Data Base (ICDB) enabling WRAMC a broader level of interactivity with the proprietary Composite Health Care System I (CHCSI).

The Military Institute of Health Services is a state-of-the-art-equipped institution operating in a wide range of medical fields and employing highly trained and fully qualified personnel. It is also one of the main research centers in Poland. It serves as the consulting center for the medical units deployed in Poland and abroad. MIHS is engaged in setting up standards and new diagnostics and therapeutic options for military medicine.

Telemedicine is one of the main areas of interests in this institution. The MIHS is equipped with a high speed information light wire network based on the star architecture with a typical speed of 100Mbps.

1.2   Hypothesis:

The research hypothesis was that TATRC-managed telemedicine technologies such as Vitel Net technology can be customized and integrated to provide a seamless communications capability for medical applications by the Polish Armed Forces.

1.3   Technical Objective:

The technical objectives of this project were to:

➢ Identify specific U.S. healthcare technologies with the highest potential for infusion into the Polish Armed Forces and

➢ Customize and integrate these select technologies to create a high speed, wireless telemedicine link for Polish military forces.

1.4   Military Significance:

U.S. military forces have demonstrated a critical need for integrating the latest advances in medical technology into a high speed, wireless telemedicine system. The rapid collection of medical information from injured soldiers enhances the health and combat readiness of the fighting force. The United States/Poland Cooperative Telemedicine Program seeks to apply recent U.S. military technology advances for the creation of a seamless, wireless telemedicine system for use by the Polish Armed Forces.

1.5   Methods:

Two MIHS computer engineers were provided onsite training concerning Vitel Net equipment standards and capabilities at Vitel Net headquarters located in McLean, VA. Vitel Net is one of the leading telemedicine focused, e-health providers. It specializes in commercial, military, and government applications and features off-the-shelf or scalable and customized, web-enabled medical solutions. Vitel Net equipment is currently being used by American forces in Iraq for telemedicine applications.

It was necessary to acquaint the engineers with technical specifications, requirements, and standards and also to demonstrate to them Vitel Net telemedicine solutions working in various sites and under different conditions. To accomplish this objective, the engineers were provided:

1) Laboratory demonstrations of the capabilities and functionality of a suite of Vitel Net telecommunication products.
2) Instruction regarding the customization, translation (English, Polish) and operation of the equipment.

3) Visits to US military hospital sites currently using Vitel Net equipment.

Based on knowledge gained from the onsite training, select technologies with the highest potential for use by Polish military forces were identified. To begin the installation process, contact with the Commander of the 4th Military Hospital in Wroclaw was initiated. For planning purposes and to ensure that the project would be completed on time, a line of communication between computer engineers and physicians at the MIHS in Warsaw and the 4th Military Hospital in Wroclaw was established. Regular meetings were conducted between these groups to facilitate the installation process.

1.6   Key Research Accomplishments:

It is now possible to make a single connection between the MIHS and the 4th Military Hospital located in Wroclaw without videoconference station (VCT) storage. The next step will be to extend the MIHS infrastructure to make possible multiple connections with a storage option. The current infrastructure allows for only a H.323 protocol connection. Future efforts will create the possibility to use a SIP protocol also.

While the scope of this project was rather limited in nature, it will help to:

1. enhance communication
2. create a state-of-the-art telemedicine service
3. prepare future e-learning projects
4. organize video teleconferences on telemedicine
5. provide expertise and other resources from central institutions to remote areas
6. create a military telemedicine network

2 Reportable Outcomes:

In November 2005, the MIHS received two VCTs from Vitel Net, Inc. These stations were initially installed at the MIHS in the Computing Department Room and the network was tested (Figure 2).
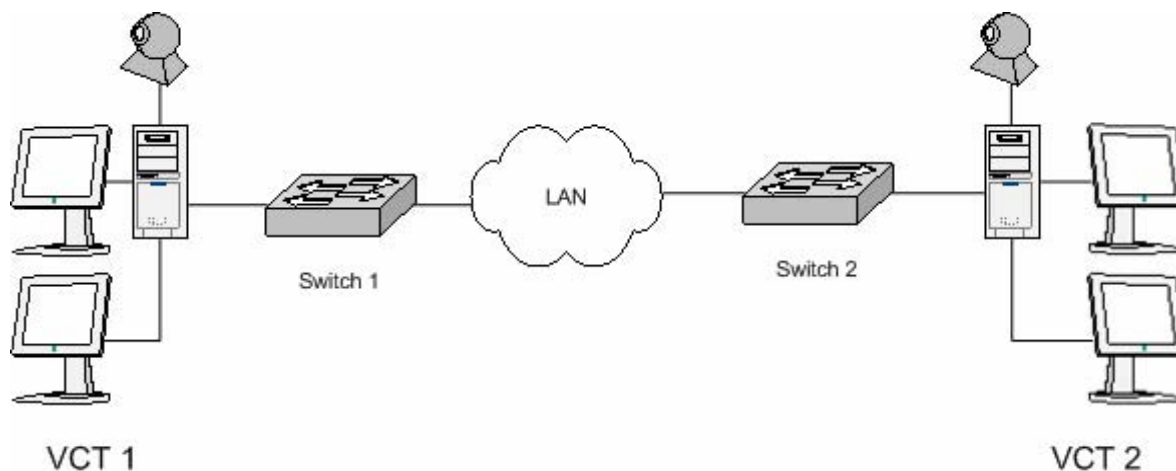

Figure 2: Network Test Schema

After the first successful test connection, the stations were moved to several MIHS locations in different departments and evaluated (Figure 3).
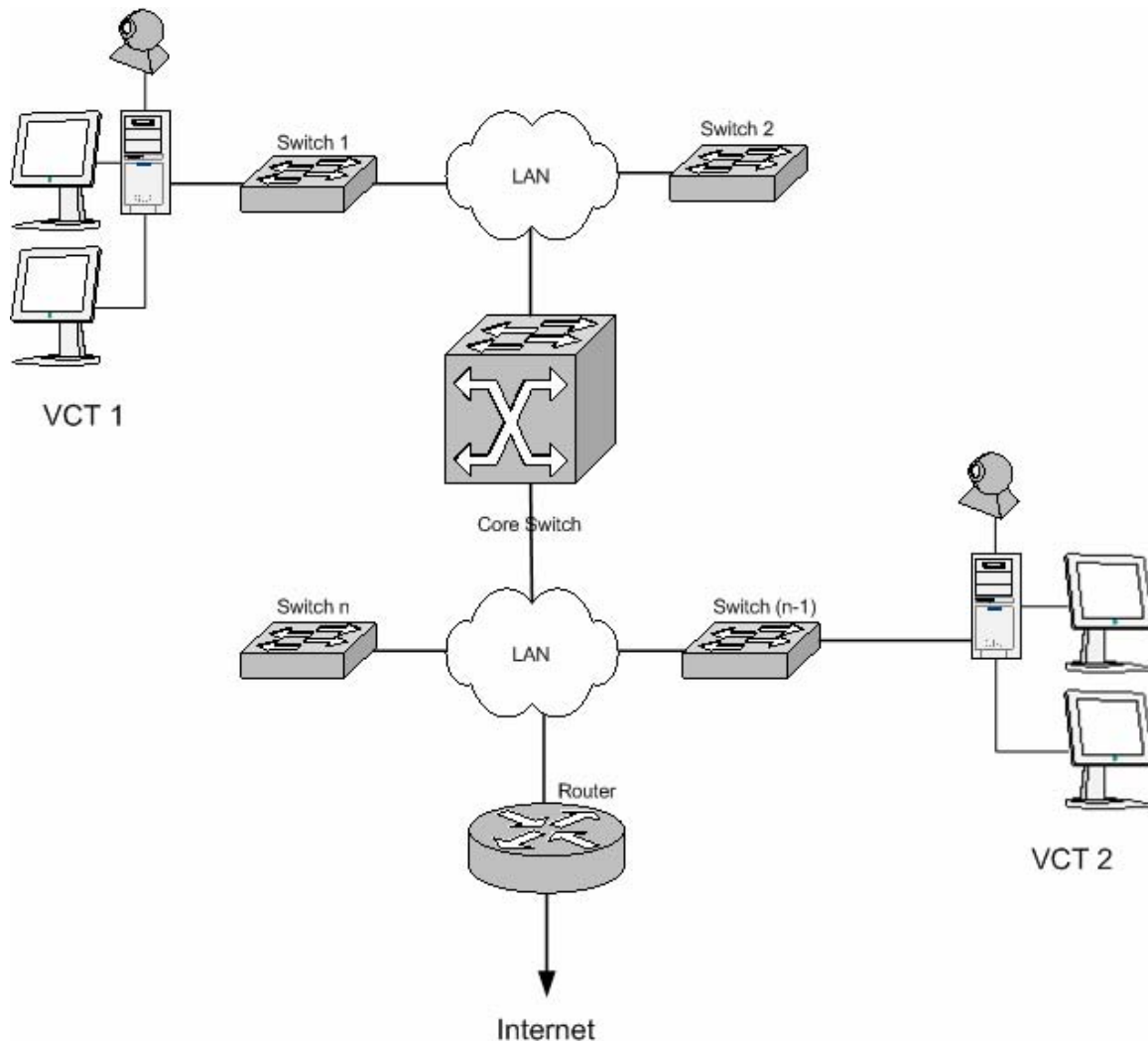

Figure 3: MIHS VCT LAN Schema

In March 2006, one of the stations was moved to the Wroclaw Military Hospital. In April 2006, two hospital departments (Nuclear Medicine Department and Emergency Room) were connected. This linkage demonstrated the capability of the Vitel Net equipment capability to exchange data over a distance (about 300 km) (Figure 4).
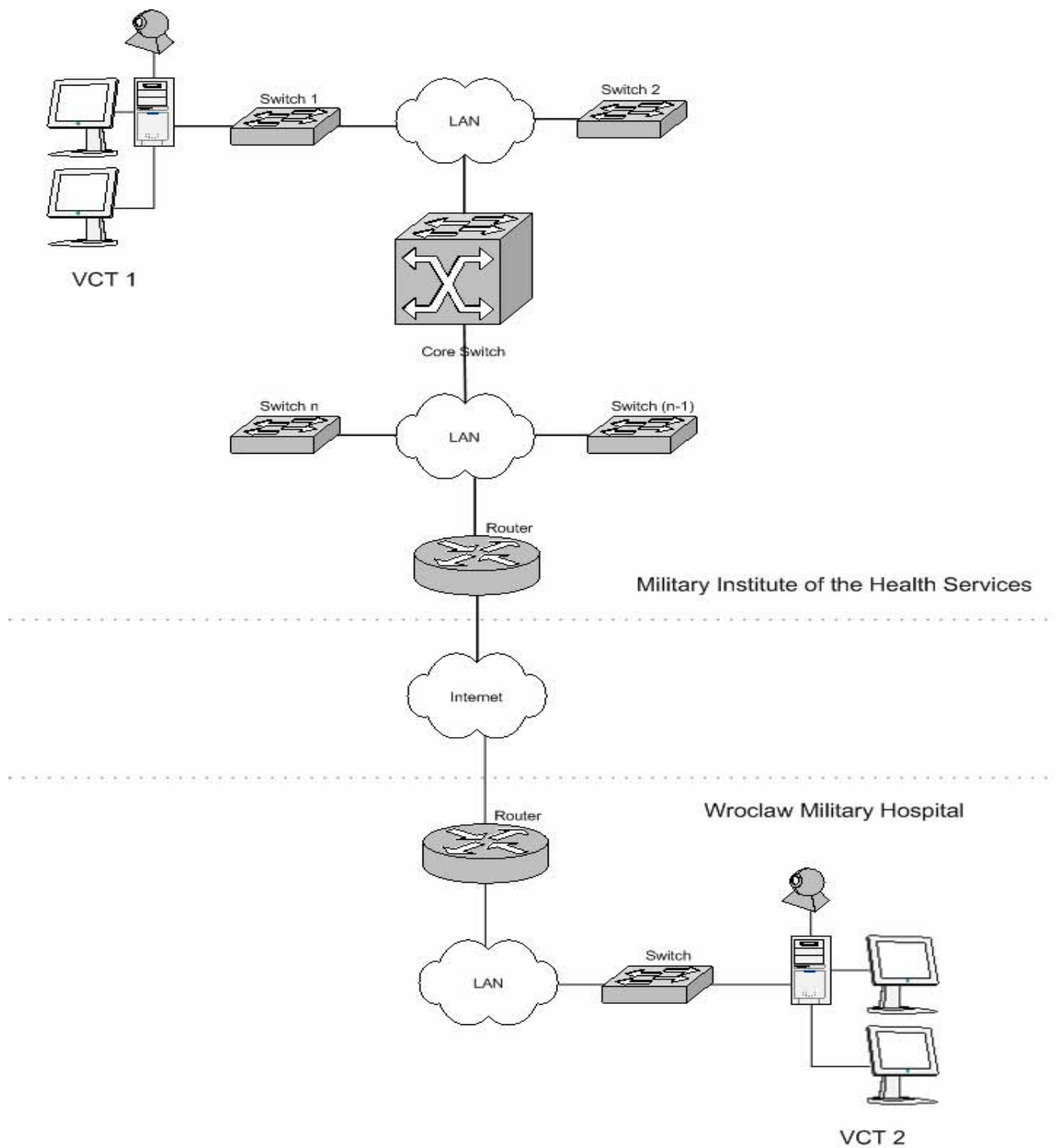
Figure 4: **Inter-Hospital Connection Schema**

3 Conclusion:

Telemedicine is gaining support worldwide. The U.S. Government recognizes the impact of telemedicine technology on the quality of medical services it provides to both military and civilian personnel. This year the US Government will spend $1B on activities and research related to telemedicine. Telemedicine introduces advanced technology solutions and provides remote specialized treatments to the patients. These unique and customized technologies are used to remotely assist clinical specialists and to monitor patients with both wounds and chronic disease conditions such as congestive heart failure, diabetes, chronic obstructive pulmonary disorder (COPD), asthma, and mental health disorders. Physicians are able to analyze changes in a patient's condition and make appropriate recommendations without evacuating the patient. This approach is of particular value when specialized physicians are not available and an evacuation is the only option to address a patient's medical condition. Of course, medical evacuations are very costly and not always recommended.

The goal of this project was initially to create a telecommunications link between the central MIHS location and the Polish Field Hospital in Karbala, Iraq. The changing role of Polish military forces in Iraq however, created a great deal of uncertainty regarding the future mission of medical personnel assigned to the Polish Field Hospital.

In order to allocate the equipment in a timely fashion, the decision was made by the TATRC program manager to install all of the equipment in Poland. This way the telemedicine system could begin to perform a useful function within the one year contract period.

In May 2006, a telecommunication system connecting military hospitals in Warsaw and Wroclaw was completed. Physicians at the MIHS are now able to remotely treat patients and manage the health care of patients at the 4th Military Hospital in Wroclaw.